CRAterre

INTERNATIONAL CENTRE FOR EARTH CONSTRUCTION

OUR AREAS OF EXPERTISE

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Ghadames, Libya © Grégoire Paccourd

PRESENTATION

Since 1979, CRAterre, International Centre for Earth Construction, has been working to promote the recognition of earth as a material and more widely the local building cultures in order to address challenges related to the environment, cultural diversity and the fight against inequalities.

It was in the post-1968 French context, marked by the emergence of environmentalism and al- ternative movements, that a small group of students from the Unité Pédagogique d'Architecture de Grenoble discovered earth as a building material, widely used in the region's vernacular architecture and known as pisé (rammed earth). The idea of building with 'what is under our feet' emerged as a response to a fundamental question: **how can humans better produce their own housing by taking advantage of local resources?**

This is how, in the seventies, the first researches and experiments were carried out enabling to regain the knowledge and the know-how which had almost disappeared during the twentieth century.

Based on the results of these researches, the founders engaged in a research and action strategy by creating CRAterre association in 1979.

Simultaneously, numerous studies, notably conducted by international organisations (UNCHS-Habitat, PNUD, ONUDI, BIRD), have shown that a large part of the world population used local materials for building and especially earth. These findings have led to the elaboration of strategies in favor of the modernization of the traditional techniques.

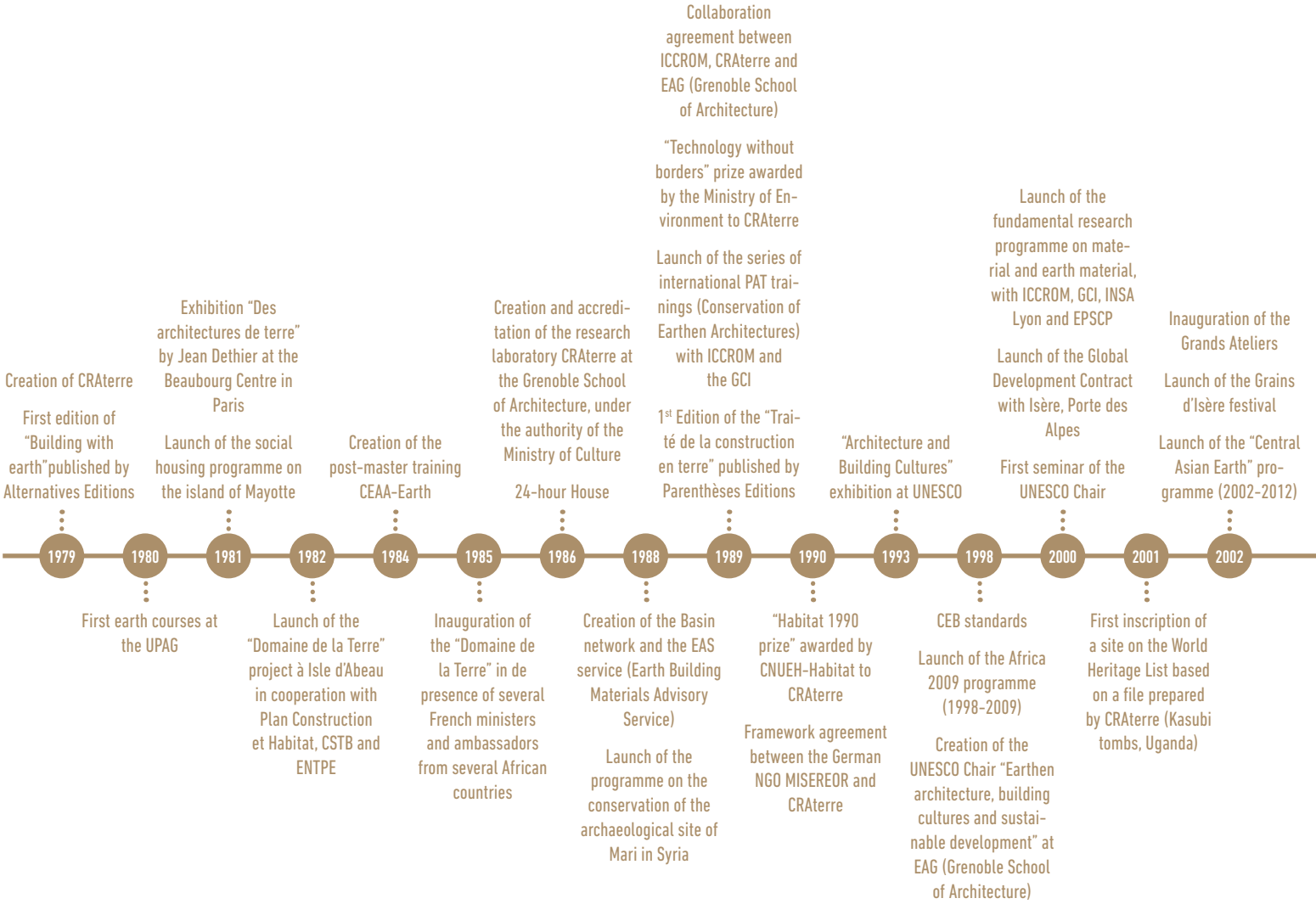
As an extension of these initiatives, CRAterre is responsible, since 1980, for launching a sector for stabilized compressed earth blocs in Mayotte, and to assist various actors to realize the Domaine de la Terre, a programme of 64 housings in Villefontaine (France).

These successfully carried out operations led to the creation of a specialized training at the Grenoble School for Architecture, and later of an eponymous research laboratory. These two structures, the association and the research laboratory, still remain complementary in their activities closely combining research and training with a strong presence in the field, in France and in the world. This allows them to propose relevant answers for the production of ecofriendly habitats and living environments, responding in an effective way to the challenges of sustainability, climate changes, cultural diversity and the fight against inequalities.

Passamainti Operation, Mayotte (1982) © CRAterre
"Domaine de la terre" construction site, France (1982-1985) © CRAterre

HISTORICAL LANDMARKS

On February 6, 1979, Patrice DOAT, Alain HAYS, Hugo HOUBEN, Silvia MATUK and François VITOUX founded CRAterre Association, acronym for "Centre de Recherche et d'Application Terre", a name that has evolved to "Centre international de la construction en terre" at the end of the eighties. In 1986, the relevance of the researches and action led to the habilitation of an eponymous research laboratory at the Grenoble School for Architecture (CRAterre-EAG). Further to these two major dates, several facts or important projects have marked the journey of CRAterre.


1979
Creation of CRAterre
First edition of "Building with earth" published by Alternatives Editions
1980
First earth courses at the UPAG
1981
Exhibition "Des architectures de terre" by Jean Dethier at the Beaubourg Centre in Paris
Launch of the social housing programme on the island of Mayotte
1982
Launch of the "Domaine de la Terre" project à Isle d'Abeau in cooperation with Plan Construction et Habitat, CSTB and ENTPE
1984
Creation of the post-master training CEAA-Earth
1985
Inauguration of the "Domaine de la Terre" in de presence of several French ministers and ambassadors from several African countries
1986
Creation and accreditation of the research laboratory CRAterre at the Grenoble School of Architecture, under the authority of the Ministry of Culture
24-hour House
1988
Creation of the Basin network and the EAS service (Earth Building Materials Advisory Service)
Launch of the programme on the conservation of the archaeological site of Mari in Syria
1989
Collaboration agreement between ICCROM, CRAterre and EAG (Grenoble School of Architecture)
"Technology without borders" prize awarded by the Ministry of Environment to CRAterre
Launch of the series of international PAT trainings (Conservation of Earthen Architectures) with ICCROM and the GCI
1st Edition of the "Traité de la construction en terre" published by Parenthèses Editions
1990
"Habitat 1990 prize" awarded by CNUEH-Habitat to CRAterre
Framework agreement between the German NGO MISEREOR and CRAterre
1993
"Architecture and Building Cultures" exhibition at UNESCO
1998
CEB standards
Launch of the Africa 2009 programme (1998-2009)
Creation of the UNESCO Chair "Earthen architecture, building cultures and sustainable development" at EAG (Grenoble School of Architecture)
2000
Launch of the fundamental research programme on material and earth material, with ICCROM, GCI, INSA Lyon and EPSCP
Launch of the Global Development Contract with Isère, Porte des Alpes
First seminar of the UNESCO Chair
2001
First inscription of a site on the World Heritage List based on a file prepared by CRAterre (Kasubi tombs, Uganda)
2002
Inauguration of the Grands Ateliers
Launch of the Grains d'Isère festival
Launch of the "Central Asian Earth" programme (2002-2012)

2004 — Launch of the scientific programme Grains de Bâtisseurs

2007 — Launch of the World Heritage Earthen Architecture Programme (WHEAP) with UNESCO (2007–2017)

2009 — "Ma terre première, pour construire demain" exhibition at the Cité des Sciences et de l'Industrie (Paris)

Publication of the book "Bâtir en terre, du grain de sable à l'architecture" by Belin editions

2010 — Creation of the AE&CC Research unit

2011 — Launch of the "Patrimoine Culturel et Développement Local" programme in West-Africa (2011-2014)

Obtainment of the Laboratoire d'Excellence status (LabEx) for the AE&CC Resarch unit (2011-2024)

2012 — Publication of the inventory of earthen architectures inscribed on the World Heritage List

WHEAP Conference at UNESCO

2013 — European project VerSus – lessons from vernacular heritage to sustainable architecture (2012-2014)

2016 — World congress TERRA2016

Terra Award 2016, first world prize of raw earth architectures

Archéo-TERRA exhibition, designed with the laboratory Archéorient / MOM for the Gallo-Roman Museum of Lyon

2017 — Codirection of the workgroup "Promoting Safer Building Working Group" with CARE International UK, hosted by the Global Shelter Cluster

2018 — Launch of the European project Cycle Terre on the valorization of excavated wasted earth as a building material (2018-2021)

"Special mention" prize of the World Habitat Award for the work carried out in Haiti since 2010

2021 — Publication of the book "Habiter la terre" by Jean Dethier with P. Doat, H. Houben and H. Guillaud, Flammarion editions

Opening of the Cycle Terre factory in Sevran

Validation of the first ATEx type A for masonry with Compressed Earth Blocks

2022 — Validation of the first Professional Standards relating to CEB masonry in Mayotte

2023 — Launch of the research programme B2M – Brick, Mortar, Masonry (2023-2026)

Development of the IMPEEC evaluation tools – Economic and environmental impact of constructing

Nile's Earth conference

2024 — International Terra Education IV conference

OBJECTIVES

While remaining faithful to the principles that led to its creation, CRAterre renews constantly its objectives, enriched by the permanent interactions between researches and field experiences carried out with various partners. Nowadays, the main objectives are to:

- Contribute to the autonomy and emancipation of the populations facing environmental and societal pressures.
- Promote social and gender equity in the field of construction and habitat.
- Contribute to a lasting and sustainable local economy.
- Limit the impact of building by reducing its ecological footprint and mitigate the impact of climate change on populations and their built habitats.
- Propose architectural solutions and accompany the adaptation to societal and environmental mutations (climate, migrations, natural risks, limited materials, conflicts, humanitarian crises and disasters).
- Promote ecological, local, organic or geosourced materials and their performances, and the applicability of the concept of circularity to the production of habitat and the conservation of earthen architectures.
- Promote the scientific research on raw earth, material, production techniques, heritage conservation and modern architecture.
- Contribute to remove regulatory barriers, adapt the standards to earth material and its constructive uses and update the charters and the conservation approaches.
- Widely disseminate the essential basics of knowledges and know-how to the construction and the conservation of earthen buildings (design principles, constructive provisions, implementation, control methods on the material and its implementation).
- Enhance the cultural diversities and their tangible and intangible heritages.
- Learn lessons from the earthen built heritage applicable to its conservation and to the modern ecoresponsible architectural production, on the technical, environmental, cultural, social and economic level as well as in terms of the global governance of a territory.
- Reinforce the local skills and support the establishment of new training institutions for the conservation of earthen architectures worldwide, notably through onsite projects, educational or participatory construction sites.
- Participate to the implementation of a network of actors, notably by creating bridges between curators, designers and materials producers in order to consolidate the regional know-how linked to the use of available natural materials.

VALUES

For each action (training, research, application, dissemination), CRAterre association brings to the fore the respect of the living beings and the natural, cultural, social and economic contexts in which they evolve.

We adopt an attitude respecting the skills and the know-how of our partners and of the populations for which we intervene and with which we work, with the objective to reinforce their dignity and their autonomy regarding encountered problems.

However, our approaches are intended to be innovative, creative, in order to provide relevant answers to the often complex requests and issues of a rapidly expanding world with very various impacts depending on local, geographical or cultural specificities.

The scientific rigor of the undertaken studies and the researches to ensure the efficiency of the actions, demand responsiveness, adaptability and a capacity to progress and to constantly improve. Moreover, we recognize the need of a diversity of skills for the realization of each project, which commits us to develop interdisciplinary methods encouraging comparative views and open-mindedness.

This work ethic is also applied internally. More particular, the relations between the members of the association and its collaborators are based on respect, confidence and mutual recognition, equity and solidarity. The search for the balance between personal accomplishment (individual) and collective interest (group) guide the decisions taken by the board of directors as well as the attitude of each person towards the others. This is encouraged by mutual listening and dialogue, the sharing of knowledges, friendliness and mutual help, personal and collective valuation, accompaniement and transmission.

In logical continuity of CRAterre's history, many members of the association participate closely in the research works carried out within the Research Unit AE&CC of the Grenoble School for Architecture (ENSAG) within the framework of their recognized status of associated member.

ACTION THEMES

CRAterre association deploys its activities in 3 main areas.

MATERIALS

Enabling raw earth construction within contemporary regulatory frameworks.
Three themes:

- Characterization of raw materials and building components,
- Construction systems, production methods and innovation,
- Evolution of the regulatory framework.

HABITAT

Building today for tomorrow. Improving access to high-quality environmental and cultural housing.

Three themes:

- Crisis preparedness and response,
- Innovative buildings, reasonable architectures,
- Precarious urban areas / housing for the most disadvantaged.

HERITAGE

Promoting cultural diversity by enhancing architectural heritage.

Four themes:

- Heritage conservation,
- Archaeology and conservation,
- World heritage,
- Heritage and development.

EARTHEN ARCHITECTURE

Since eleven millennia, humanity demonstrates an astonishing capacity to build with earth, either simple dwellings, palaces or entire cities. Nowadays, in very various contexts and territories, this building material still remains widely used as it is present in more than 150 countries. Earthen architectures witness of a quality of daily life and of a technical innovation closely mixing know-how and ingenuity.

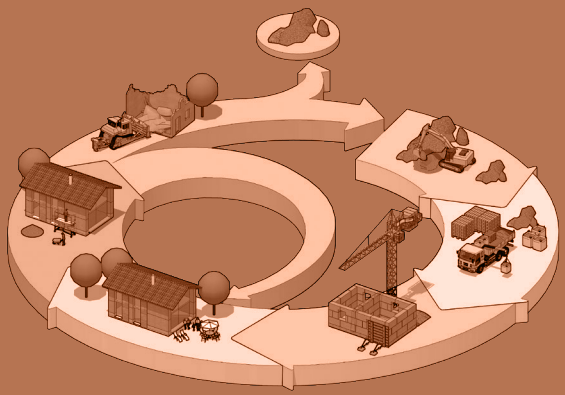
SOCIAL AND ENVIRONMENTAIL ASSETS OF EARTH

Qualities of the earth material

- An abundant, local and infinitely renewable resource.
- Favors the constructive intelligence thanks to its diversity of techniques.
- Adapts to constructive modern innovations (prefabrication, 3D printing).
- Provides good acoustic isolation by its mass.
- Non-combustible, it constitutes a natural barrier against fire.

Flexibility of the implementation

- Reduces inconveniences linked to the construction site (limited noise pollution, low mechanization).
- Generates little waste on the production site.
- Compatible with the manual techniques and participative projects.



- Encourages the transmission of the traditional craftsmanship and vernacular practices.
- Adapted to projects of all sizes, from individual habitats to public facilities and urban planning.

Comfort and well-being

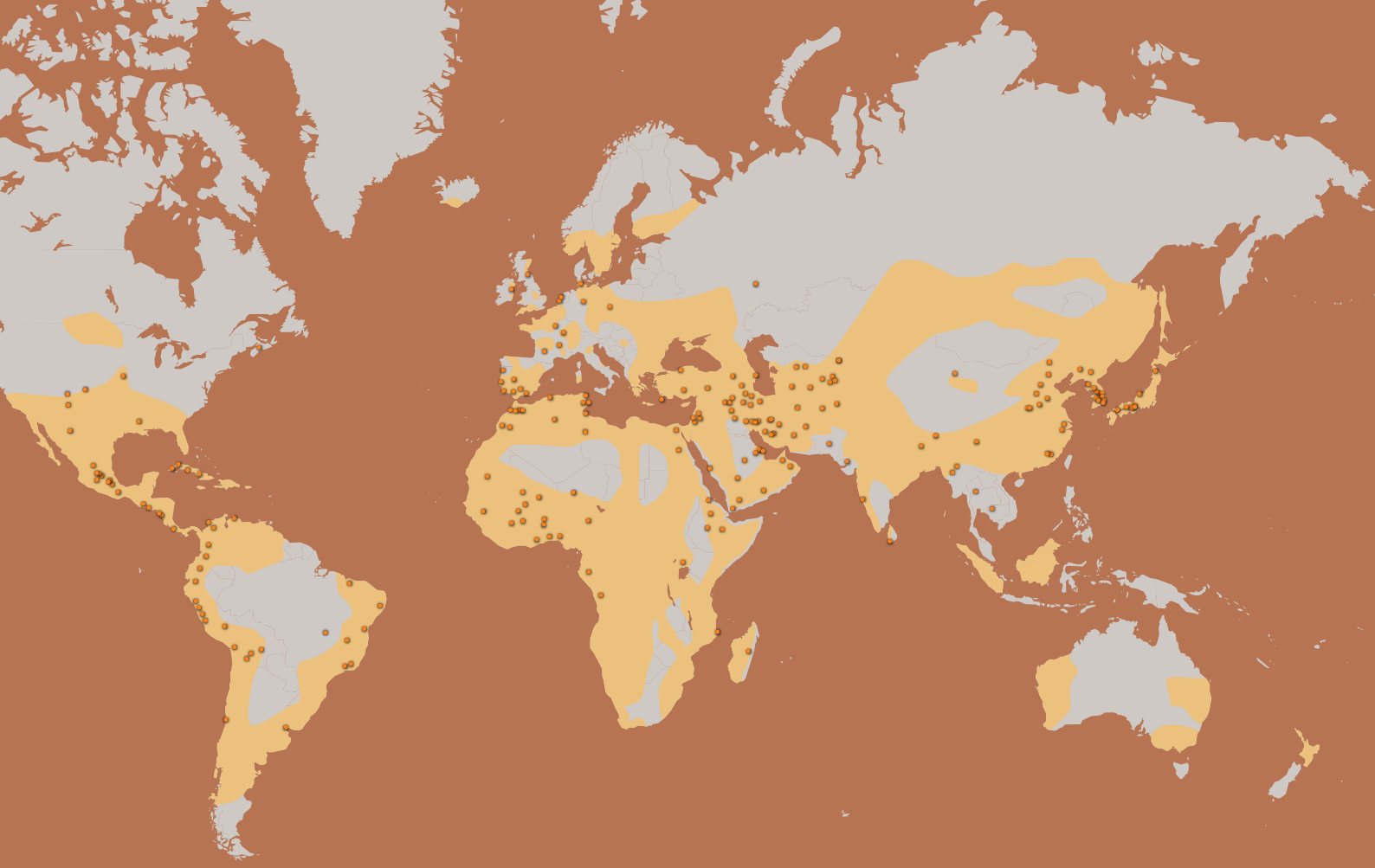
- Regulates naturally the humidity and the interior temperature (thermal inertia, hygrothermal comfort).
- A healthy material for its constructors and for its users.
- Contributes to the reduction of heat islands regulating naturally the thermal exchange with the environment.

Architectural qualities

- Enables the creation of organic shapes and unique architectural styles.
- Combines easily with other local complementary materials (wood, stone, bamboo...).
- Facilitates extensions and rehabilitation thanks to a modifiable structure.

Energy performance

- Low grey energy (extraction, transformation, transport).
- Good performances in use phase (reduction of heating and air condition needs).
- Compatible with low-carbon approaches and the actual environmental benchmarks (HQE, RE2020, etc.).



EARTHEN ARCHITECTURES IN THE WORLD

World Heritage sites with raw earth buildings

Distribution of earthen architectures in the world

Social impact

- Reinforces the social cohesion through the collective participation to construction.
- Creates intergenerational solidarity and transmission of knowledge dynamics.
- Favors community involvement and neighborhood ties.

Local economic dynamics

- Generates local sustainable employment and values craft skills.
- Reduces the costs of building in contexts where industrial imported materials are expensive.
- Favors the self-sufficiency and the economic resilience of the territories.

Territorial and environmental integration

- Adapts to the bioclimatic and landscape characteristics of the site.
- Respects the local ecosystems and preserves the biodiversity.
- Maintains the identity of the cultural landscapes and values the local specificities.

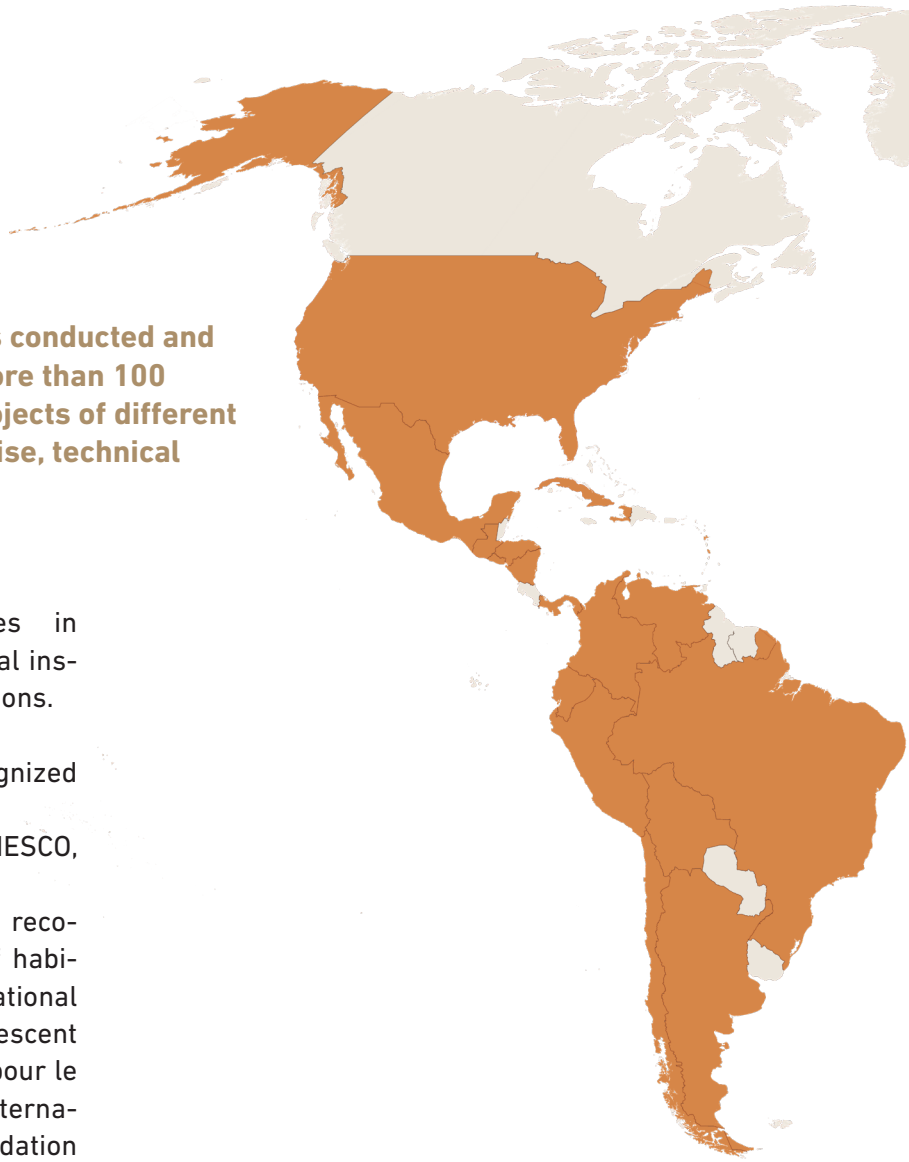
Cultural and heritage value

- Reinforces the collective identity being part of the continuity of traditional know-how.
- Favors a sensitive and historical understanding of the inhabited territories.
- Supports creativity and artistic expression.

Responsible life cycle

- Recyclable, biodegradable and reusable material without heavy processing.
- Easy maintenance and simple repairs.
- Global reduction of the pollution and construction waste.

PROJECTS



Since its creation, the association has conducted and capitalized on field experiences in more than 100 countries across all continents on projects of different sizes and of different natures: expertise, technical support, training, etc.

CRAterre has developed programmes in partnership with international and national institutions and non-governmental organizations.

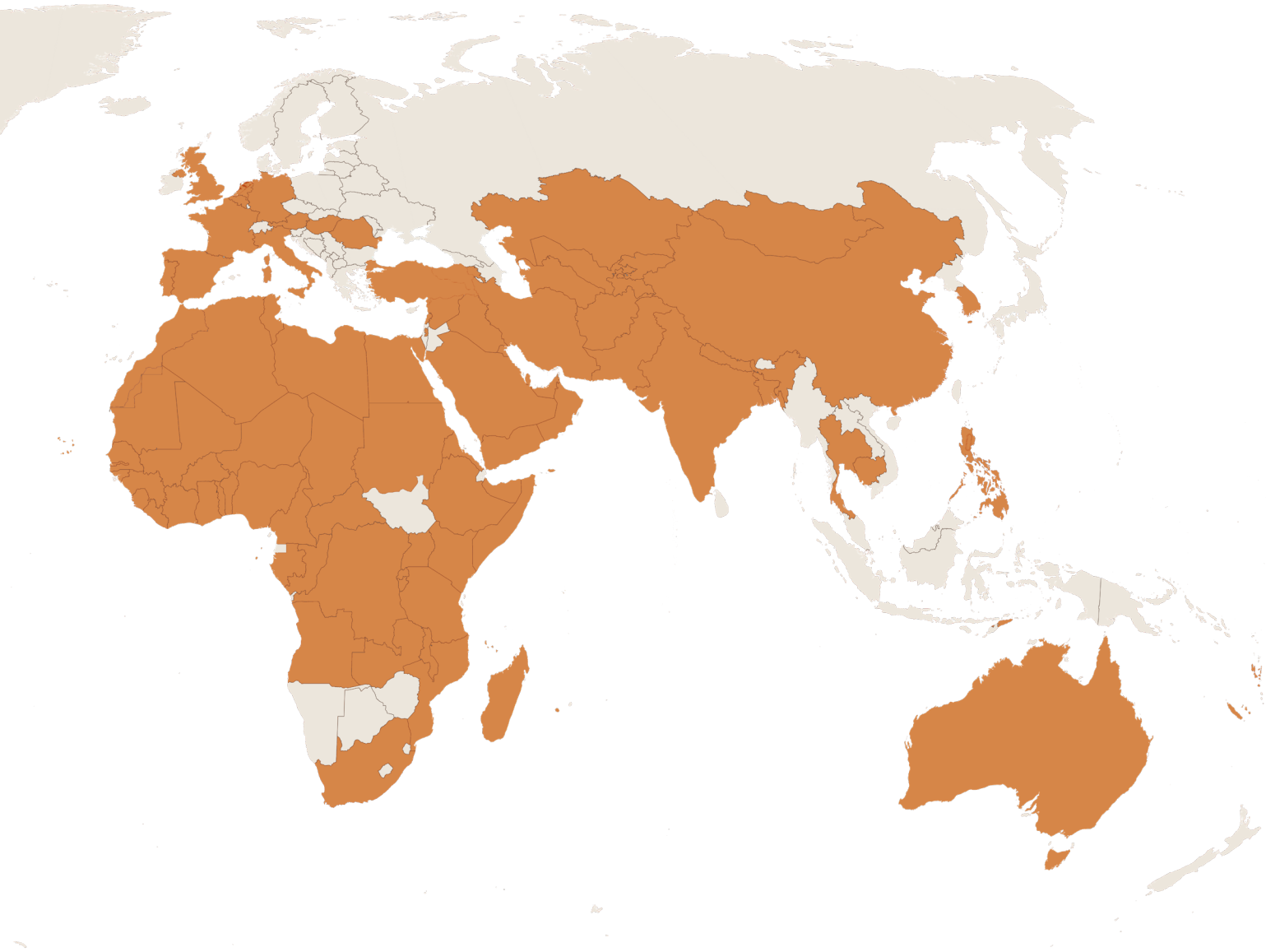
Since its creation, CRAterre has been recognized by numerous institutions:

- United Nations organizations (UNESCO, UN-Habitat, UNHCR, UNEP, IOM, etc.),
- Financial institutions and partners recognized for their action in the field of habitat and heritage conservation (International Federation of Red Cross and Red Crescent Societies (IFRC), Misereor, Fondation pour le Logement des Défavorisés, Caritas Internationalis, Catholic Relief Services, Fondation de France, French Ministry of Culture, ICCROM, ALIPH, AIMF, etc.)..

CRAterre association collaborates with several networks (UNESCO Chair "Earthen architecture, building cultures and sustainable development", ICOMOS France, ICOMOS ISCEAH, Coordination Sud, Groupe Initiatives, Global Shelter Cluster, Partenariat français pour les villes et territoires, Association française du génie parasismique, etc.) with which actions and reflections are carried out aiming to improve the sectors contribution to achieve the United Nations Sustainable Development Goals.

COUNTRIES OF INTERVENTION

1. Afghanistan
2. Algeria
3. Angola
4. Argentina
5. Armenia
6. Australia
7. Austria
8. Bangladesh
9. Belgium
10. Benin
11. Bolivia
12. Brazil
13. Burkina Faso
14. Burundi
15. Cambodia
16. Cameroon
17. Cape Verde
18. Central African Republic
19. Chad
20. Chile
21. China
22. Colombia
23. Comoros
24. Congo
25. Cuba
26. Democratic Republic of the Congo
27. Ecuador
28. Egypt
29. El Salvador
30. Eritrea
31. Ethiopia
32. Fiji
33. France
34. Gabon
35. Gambia
36. Germany
37. Ghana
38. Guatemala



39. Guinea
40. Guinea-Bissau
41. Guyana
42. Haiti
43. Honduras
44. Hungary
45. India
46. Indonesia
47. Iran
48. Iraq
49. Israel
50. Italy
51. Ivory Coast
52. Kazakhstan
53. Kenya
54. Kuwait
55. Kyrgyzstan
56. Lebanon
57. Liberia
58. Libya
59. Madagascar
60. Malawi
61. Mali
62. Martinique
63. Mauritania
64. Mexico
65. Mongolia
66. Morocco
67. Mozambique
68. Nepal
69. Netherlands
70. New Caledonia
71. Nicaragua
72. Niger
73. Nigeria
74. Oman
75. Pakistan
76. Palestine
77. Panama
78. Peru
79. Philippines
80. Portugal
81. Romania
82. Rwanda
83. Sao Tome and Principe
84. Saudi Arabia
85. Senegal
86. Sierra Leone
87. Somalia
88. South Africa
89. South Korea
90. Spain
91. Sudan
92. Syria
93. Tajikistan
94. Tanzania
95. Thailand
96. Timor-Leste
97. Togo
98. Tonga
99. Tunisia
100. Turkey
101. Turkmenistan
102. Uganda
103. United Arab Emirates
104. United Kingdom
105. United States
106. United States
107. Uzbekistan
108. Vanuatu
109. Venezuela
110. Yemen
111. Zambia

DISSEMINATION

In order to respect its fixed objectives, CRAterre association works on the dissemination of the knowledge to a wide audience using different mediums.

THE DOCUMENTATION CENTRE

The management of the documentation centre has been assured alternately by the association and the laboratory. Its documentary collection, constituted since the seventies by the founders of CRAterre, has over time been enriched with scientific and technical productions of the members of the research team and the association as well as by new acquisitions and donations of partners.

This collection indeed gathers nearly 20 000 documents in the fields of earthen architecture and local building cultures as well as other linked themes as for example vernacular architecture, building techniques with natural materials, improvement of the habitat, reduction of natural risks, archaeology, heritage conservation, world heritage, ecology, climate change, project planning and management, etc.

The documentation centre receives and accompanies every year visitors from all over the world (researchers, students, professionals and general public).

CRAterre documentation at the ENSAG © Audrey Carbonnelle

KEY FIGURES

- **20 000** documents
- **80 000** slides
- **+500 000** photos
- **300** VHS tapes/DVDs
- **150** countries covered
- **25** languages

World Heritage Exhibition, 1992-2012 © Sébastien Moriset
Large audience workshop, Grains d'Isère Fesitval © Patrice Doat
ArchéoTerra Exhibition © Sébastien Moriset
Pedagogical kit ÉlémenTerre © Audrey Carbonnelle

MEDIATION ACTIVITIES

For 45 years, the members of CRAterre have been working for the dissemination of science, technology, art and culture as a way to act with the young generations and the general public. The aim is to allow them to discover new horizons, to deepen their knowledge in specific fields and to provide them with the necessary tools to observe, understand and analyze the world surrounding them. The objective is also to encourage the public to explore new ways of interacting with the material, the living and the Earth.

With this aim in mind, CRAterre has developed original and innovative pedagogical tools like the pedagogical kit ÉlémenTerre, the Plané'Terre programme, the artistic workshop Matter & Emotions and a pedagogical kit on seismic risks.

In addition to these tools, CRAterre regularly designs exhibitions mixing informative textual supports and interactive activities, allowing visitors to explore the themes in a pedagogical and playful way. These exhibitions aim to stimulate the curiosity of the participants by inviting them to experiment and to meditate on the challenges linked to our environment.

Thanks to the support of IDEX UGA, a permanent pedagogical workshop has been installed at the Grenoble School for Architecture (ENSAG) allowing to receive, on request, small groups of students but also the general public.

DISSEMINATION

CRATERRE EDITIONS

Since 1987, CRAterre Editions are dedicated to the valorization of the heritage and the local building cultures, emphasizing in particular the use of earth as a construction material. This publishing house commits itself to promote works exploring traditional and modern building and rehabilitation techniques with earth, offering consequently valuable resources to professionals, students and all sustainable architecture lovers.

CRAterre Editions also publish proceedings of congresses allowing to disseminate the results of the latest researches and innovations in the field, as well as pedagogical material to raise awareness and train on issues related to the use of earth and local materials.

These publications are **freely downloadable online** in order to promote the dissemination of knowledge.

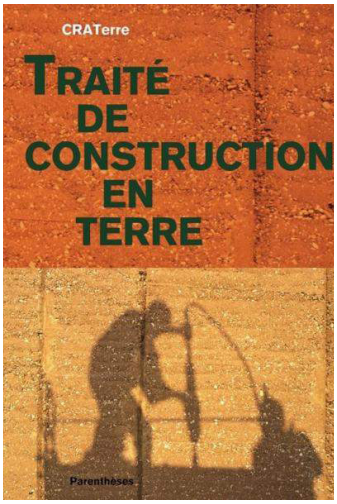
OTHER PUBLICATIONS

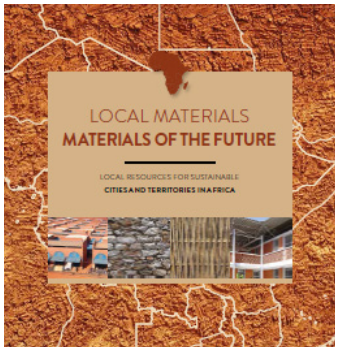
The members of CRAterre also contribute to the production of literature with other recognized publishing houses like Actes Sud, Le Moniteur, Flammarion or national and international magazines like Heritage, Built Heritage, Engineering Structures or Les Cahiers de la recherche architecturale, urbaine et paysagère. This testifies of their commitment to enrich the editorial landscape around the themes linked to earth and constructive cultures.

Moreover, CRAterre's expertise is often requested in the framework of the participation to scientific committees of national and international events (colloquia, seminars, conferences, congresses).

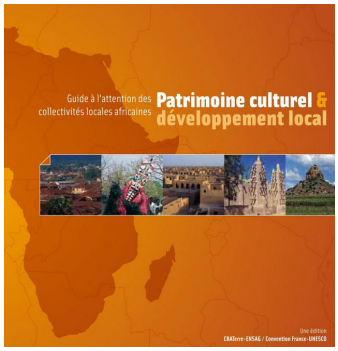
© Dora Studer

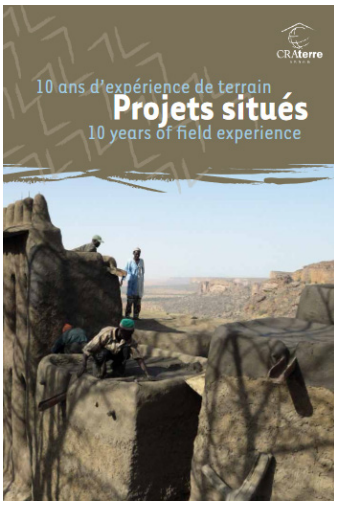
View team members' publications online for free at https://craterre.hypotheses.org/


CRATerre
TRAITÉ DE CONSTRUCTION EN TERRE
Parenthèses


LOCAL MATERIALS
MATERIALS OF THE FUTURE
LOCAL RESOURCES FOR SUSTAINABLE CITIES AND TERRITORIES IN AFRICA

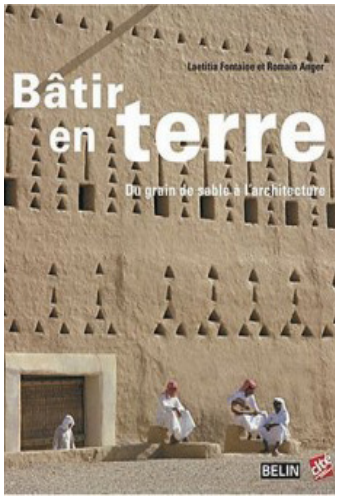
Construire en pisé
Prescriptions de dimensionnement et de mise en œuvre
Editions LE MONITEUR
CRAterre

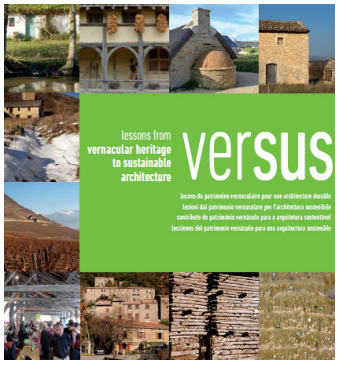

Guide à l'attention des collectivités locales africaines
Patrimoine culturel & développement local

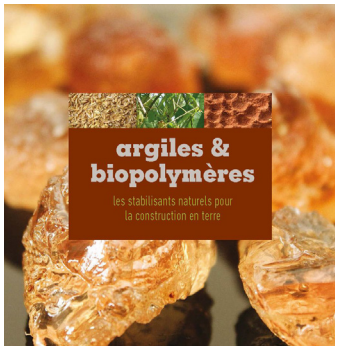

CRAterre
10 ans d'expérience de terrain
Projets situés
10 years of field experience

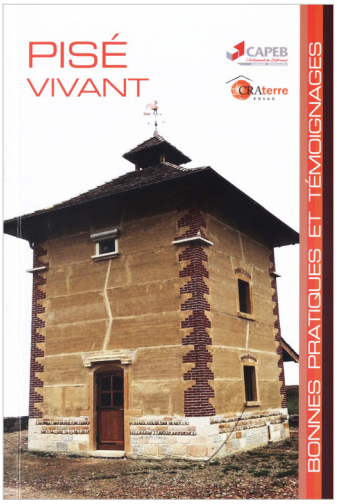
JEAN DETHIER
HABITER LA TERRE
L'ART DE BÂTIR EN TERRE CRUE
TRADITIONS, MODERNITÉ ET AVENIR
Flammarion

Dominique Gauzin-Müller
ARCHITECTURE EN TERRE D'AUJOURD'HUI

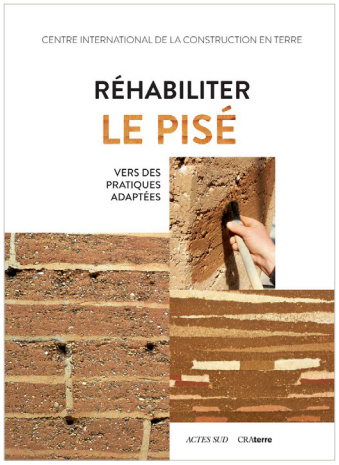

Laetitia Fontaine et Romain Anger
Bâtir en terre
Du grain de sable à l'architecture
BELIN


lessons from
vernacular heritage
to sustainable
architecture
versus

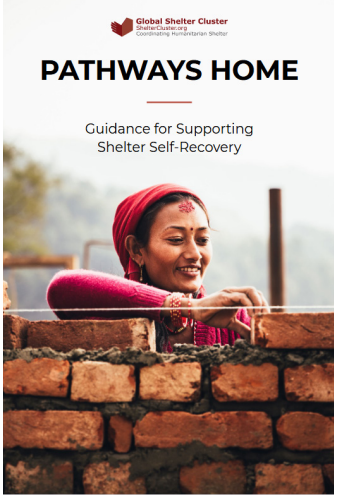

argiles & biopolymères
les stabilisants naturels pour la construction en terre


PISÉ VIVANT
CAPEB
CRAterre
BONNES PRATIQUES ET TÉMOIGNAGES

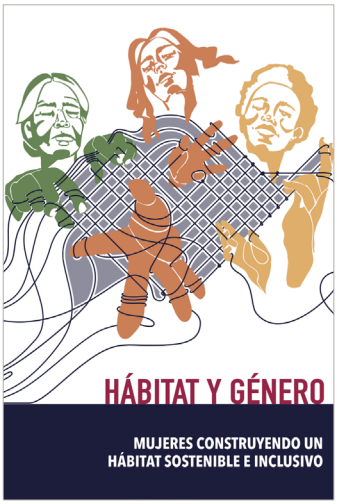
FRANZ VOLHARD
CONSTRUIRE EN TERRE ALLÉGÉE
ACTES SUD


CENTRE INTERNATIONAL DE LA CONSTRUCTION EN TERRE
RÉHABILITER LE PISÉ
VERS DES PRATIQUES ADAPTÉES
ACTES SUD
CRAterre

world habitat awards
(RE) CONS-TRUIRE EN HAÏTI
2010 - 2019
L'ÉMERGENCE DU CONCEPT DE TCLA
CRAterre / AE&CC
Novembre 2019


Global Shelter Cluster
PATHWAYS HOME
Guidance for Supporting Shelter Self-Recovery

RECONSTRUCTION WITH LOCAL ARCHITECTURE
PANAY ISLAND, PHILIPPINES, 2014 - 2017


HÁBITAT Y GÉNERO
MUJERES CONSTRUYENDO UN HÁBITAT SOSTENIBLE E INCLUSIVO

de developpement Local
GENRE & HABITAT
REGARDS CROISÉS DES PARTENAIRES DE LA FONDATION ABBÉ PIERRE

WHO ARE WE?

In order to implement its mandate, CRAterre cooperates with about one hundred persons from different nationalities and disciplines with a more particularly active core team of about 40 persons. In 2024, activities have been implemented:

WITH THE DIRECT IMPLICATION OF THE MEMBERS AND THE EMPLOYEES:

ANGULO Dario, architect

BARDAGOT Anne-Monique, ethnologist

BELINGA NKO'O Christian, architect

BERTAGNIN Mauro, architect

BOIVIN Elisabeth, tourist interpreter guide

CARAZAS AEDO Wilfredo, architect

CARBONNELLE Audrey, manager of documentary studies and mediation

CARIGNANO Leandro, manager of the administrative and financial unit

CARRILLO Elena, architect

CAUDERAY Elsa, architect

CHANSAVANG Quentin, architect

CHAMODOT Mathilde, architect

CHAUVIN Christèle, accountant

CRETE Eugénie, engineer*

DALI, Amdjed Islam, architect

DAVIS Lara, architect

DAYRE Michel, engineer*

DEJEANT Florie, engineer

DE LA RICA EXTREMIANA Jon, architect

DOAT Patrice, architect

d'ORNANO Sébastien, agricultural engineer

DOULINE Alexandre, building technician

ENCISO BENITES Liz, archaeologist

ESTEBAN AVALOS Héctor, architect

ESTEVE Josep, architect

FERREIRA MENDES Miguel, architect

GALER Titane, manager and archivist

GANDREAU David, archaeologist*

GANDUGLIA Mauricio, architect

GARCIA Carolyn, architect

GARNIER Philippe, architect*

GASNIER Hugo, architect

GUEGUEN-PERRIN Anaïs, architect

GUILLAUD Hubert, architect

HAJMIRBABA Majid, engineer

HENNOUS Mourad, architect

HOLST Jean-Paul, architect

HOSTA Julien, architect

HUBERT Alix, architect*

LE TIEC Jean-Marie, architect*

LIPPE Heiner, architect

MAINI Serge, architect

MISSE Arnaud, architect*

MOLES Olivier, master's degree in local development engineering, Civil engineering technician*

MORISET Sébastien, architect*

NOUWENS Bregje, secretary

OLIVER David, architect

PACCOUD Grégoire, architect

RAKOTOMAMONJY Bakonirina, architect*

RAMIREZ Beatriz, architect and conservator

RIVERO OLMOS Alba, architect

RUIZ Eric, town planner architecte*

SADOZAI Chamsia, archaeologist

SANCHEZ MUNOZ Nuria, architect

SEVILLANO GUTIERREZ Enrique, architect

TRABANINO Juan, architecte

TRAPPENIERS Marina, engineer architect*

VIEUX-CHAMPAGNE Florent, engineer

VOLHARD Franz, architect

* members of the Management Board

WITH COMPLEMENTARY CONTRIBUTIONS OF:

BARRY Alyssa
CISSE Abdoulaye
MICHAUD Barbara
N'TCHA Dieu-Donné
PENET Paola
QUILICHINI Camille
SABATIER Nathalie
ZACCARO Eva

AND THE SUPPORT OF:

BONNEVIE Maxime
CORBA BARRETO Mauricio
FLECHEUX Marie
FONTAINE Laetitia
FREITAS Sébastien
JOFFROY Thierry
KHALILI Sayed
LICITRA Nadia
MAMA AWAL Halimatou
MAZEL Yvan
MILLE Emmanuel
NOURDIN Julien
PLATTARD Odile
POINTET Martin
RAKOTONIRINA Mampionona
SALERNO Claude
SOARES RODRIGUES David
TOUZARD Inès
ZAWITOWSKI Marie
ZAWITOWSKI Keith

MATERIALS UNIT

"Terres de Paris" exhibition © Hugo Gasnier

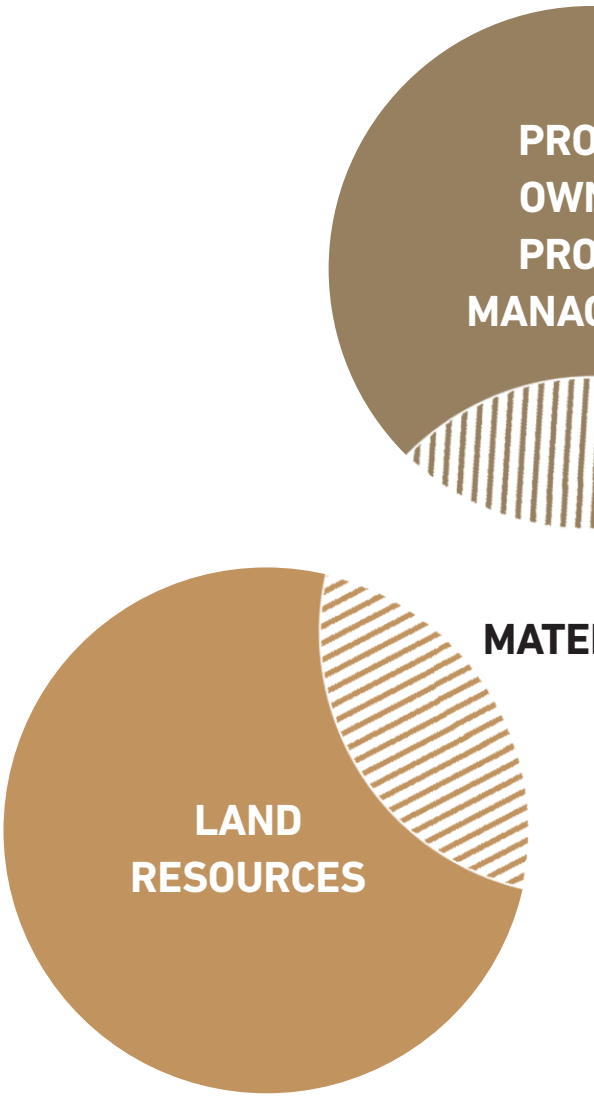
THE MATERIALS UNIT

Given today's environmental challenges and the impact of construction, materials selection at the outset of an architectural project is a critical decision.

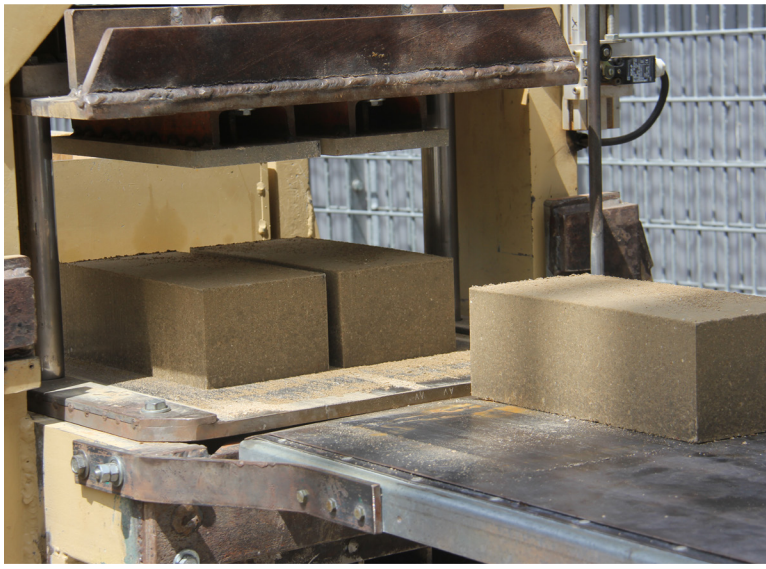
In our effort to promote local building practices, reduce environmental impact, and favour short supply chains, our team works alongside all project stakeholders to facilitate the use of raw earth materials.

We share our expertise with all parties involved to collaboratively address the specific challenges linked to the use of these still largely non-standardised materials.

The Materials Unit serves as a bridge between materials and architecture. We consider the full scope of the construction process—from assessing the potential of a territory to the successive stages of material production, structural design, and building implementation. Each project becomes an opportunity to reinforce the building culture of a territory and empower its stakeholders.



On-site rammed earth construction © Jérémie Basset
CEB Production © Alix Hubert
On-site rammed earth construction © Hugo Gasnier
CEES of Orléans © Paul Kozlowski



JECT
NER /
JECT
GEMENT

RIALS

COMPANY

FIELDS OF ACTION

From raw materials to architecture: supporting the implementation of raw earth construction projects.

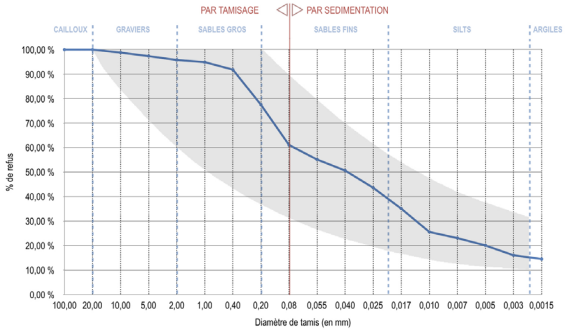
The Materials Unit is dedicated to advancing the use of raw earth in the construction sector. It supports stakeholders throughout all phases of their projects involving this material, in particular by:

- assisting project owners, designers, and construction companies from design to completion,
- providing technical validation of raw earth structures and contributing to the drafting of normative documents,
- assisting to structure production chains for raw earth-based materials,
- characterising soils and raw earth materials.

Materials is a unit within the CRAterre association that provides expertise to the Heritage and Habitat units. The unit's field projects and the research conducted by the CRAterre laboratory team enrich each other, fostering close links between fieldwork, laboratory research and teaching.

OPERATIONAL AND EDUCATIONAL RESEARCH AND EXPERIMENTATION

© Inès Touzard



© Cycle Terre Project

AN ITERATIVE PROCESS

OPERATIONAL AND EDUCATIONAL RESEARCH AND EXPERIMENTATION

© Alizée Cugney

© Alix Hubert

OPERATIONAL CONSTRUCTION SITES

© Jérémie Basset

© Jean-Marie Le Tiec

SKILLS AND SERVICES

The Materials Unit provides expertise in the following areas:

SUPPORT FOR PROJECT MANAGEMENT AND PROJECT OWNERS

1. Project Assessment and Planning
   - Understanding the project context (location, scale, technology, goals),
   - Providing support during the planning phase.

2. Context (heritage, available raw materials, and local know-how) and Feasibility Studies
   - Identification and analysis of local soils,
   - Guidance in selecting the appropriate raw earth construction technique,
   - Material formulation and, if needed, laboratory characterisation,
   - Overall feasibility analysis (technical, economic, logistical, etc.).

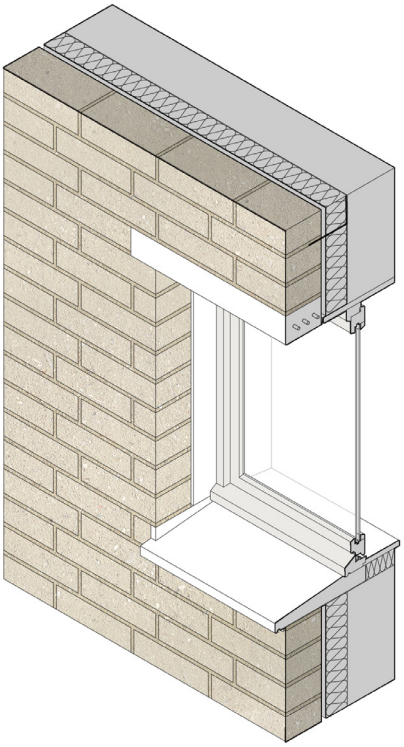
3. Support for architectural design
   - Development of raw earth construction details and interfaces with other materials,
   - Structural calculation notes in collaboration with structural engineering consultants,
   - Assistance with drafting technical specifications and defining the implementation schedule.

4. Technical Justification for Raw Earth Construction
   - Strategy development for technical justification,
   - Coordination of testing campaigns,
   - Preparation of technical approval files (e.g., ATEX-type documentation in France).

5. Assistance with Contractor Selection and Tendering
   - Support in identifying qualified companies and awarding contracts for raw earth works.

6. Support During Construction and Delivery
   - Assistance with site supervision and handover of raw earth structures.

Our support can be provided throughout the entire project lifecycle or focused on specific phases. However, we strongly recommend involving us from the design stage to ensure compatibility with raw earth construction techniques.



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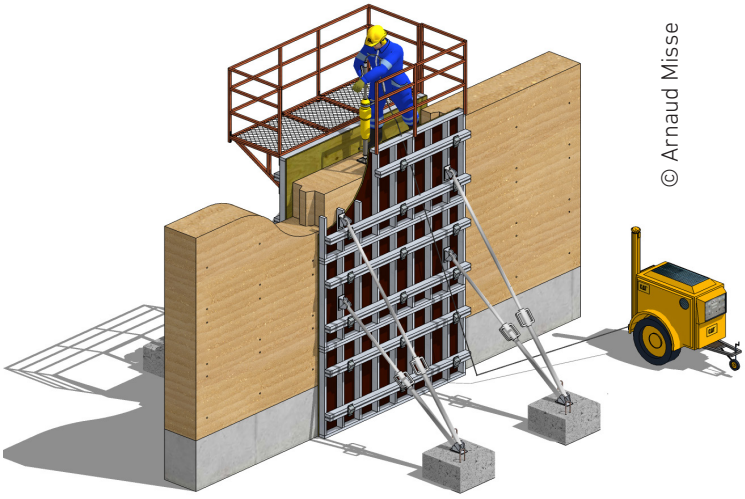
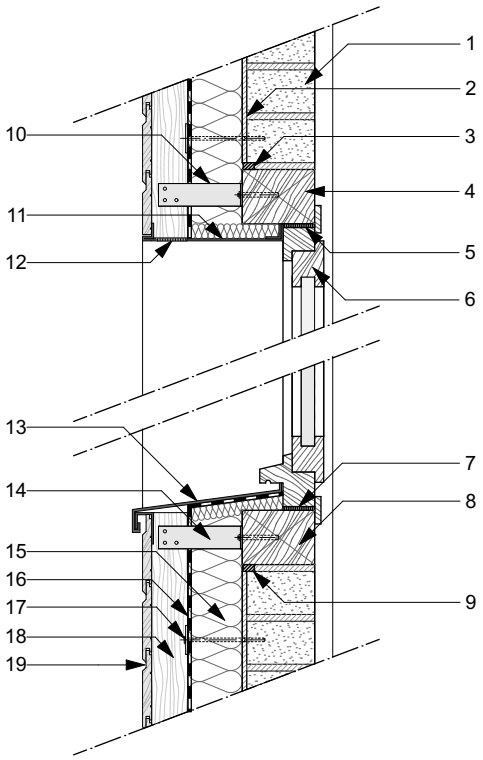
SUPPORT FOR CONSTRUCTION COMPANIES

1. Project feasibility assessment (structural, economic, planning, etc.),
2. Support with tender preparation and cost estimation for raw earth work packages,
3. Analysis of on-site soils and exploration of nearby quarries to identify suitable materials,
4. Material formulation,
5. Guidance in selecting a structural engineering firm (execution plans and structural calculations),
6. Assistance in planning and carrying out test campaigns, and in preparing certification files (e.g., ATEx-type approvals in France),
7. Training of construction teams through the building of prototype walls,
8. Support in setting up material production and implementing quality control procedures,
9. Assistance in developing specific tools and equipment adapted to the chosen construction technique and scale of the project.



© Arnaud Misse



© Inès Touzard

SKILLS AND SERVICES

STRUCTURING RAW EARTH MATERIAL SUPPLY CHAINS FOR CONSTRUCTION

1. Feasibility analysis for establishing a raw earth production unit
    - Assessment of the territory and local context in relation to the development of a raw earth sector, including market analysis,
    - Resource evaluation and support in selecting materials for production,
    - Comparative study of the environmental impacts of different materials and production methods,
    - Initial technical, logistical and economic guidelines,
    - Development of a risk management strategy for the project.

2. Design of the production unit
    - Analysis of soil sourcing and preparation processes,
    - Material formulation and characterization,
    - Research and development for material implementation, including prototype construction,
    - Design of production lines and associated R&D activities,
    - Comprehensive project assessment to ensure alignment between technical plans, financial investment, available land and project timeline,
    - Drafting of technical specifications for the installation of production lines.

3. Support for Production Unit Implementation
    - Management of soil supply logistics,
    - Assistance with equipment selection, procurement and installation,
    - Coordination of material testing and characterisation campaigns,
    - Development of technical documentation and user guides,
    - Technical support for marketing,
    - Organisation of demonstration construction sites,
    - Support in setting up quality control processes,
    - Guidance on equipment maintenance.

Exploratory fire tests © B2M Project / Inès Touzard

TECHNICAL AND REGULATORY VALIDATION

- Support in defining a technical and regulatory validation strategy, including risk management,
- Participation in the development of normative documents, technical dossiers, and certification files (e.g., ATEx, professional guidelines, standards),
- Organisation of testing campaigns, analysis of results, and characterisation of materials and structural elements.

SELECTED REFERENCES

ONGOING AMATECO - Mahoran Workshop for Earth-Based Construction Materials: Structuring a low-carbon production supply chain on the island of Mayotte - Project Lead: ART.Terre Mayotte

ONGOING B2M – Research Project: Mechanical, fire, and hygrothermal characterisation of various raw earth masonry types - In partnership with AE&CC, 3SR, CSTB, and CTMNC https://aecc.hypotheses.org/6250

ONGOING Henri Becquerel General and Technological High School, Nangis (77): Training in raw earth masonry (BTCS and BTE certifications) - Company: CRUARD Charpente / COFIBAT SAS

ONGOING Henri Becquerel General and Technological High School, Nangis (77): Support in drafting an ATEx B - Design Team: COSA / Client: Île-de-France Region / Contractor: CRUARD Charpente

ONGOING Technical support for the validation of raw earth structures (submission of an ATEx B or alternative process) within the OPHROM project in Martinique – Design Team: MEAT Architecture – BIM Caraïbes / Client: OZANAM – Action Logement Group

ONGOING Design assistance for the integration of raw earth walls in the Guipry-Messac Cinema (35) - Design Team: Linéaire A – OTE Ingénierie

ONGOING Tani Malandi High School, Chirongui - Mayotte: Design assistance for raw earth block masonry (CEB) - Design Team: FBAA Architects + Dietrich | Untertrifaller Architectes SARL / Client: Rectorate of Mayotte

2024 Development of the IMPEEC decision support tool (Assessment of environmental and economic impacts of construction) - Partners: French Development Agency (AFD) and Foundation for Housing for the Disadvantaged

2024 Environmental assessment of various temporary shelter solutions in Somalia - Client: International Organization for Migration (IOM)

2023 Feasibility study for establishing a raw earth material production facility in Martinique - Client: KEMET Bâtisseurs Association

2023 Rehabilitation of a former sanatorium into a hospitality complex in Dreux (28) - Design assistance - Design Team: VP & Green Engineering

2022 Longoni Vocational High School for Building Trades, Mayotte - ATEx B - Support to engineering firm Vessières – Design Team: EH archi + COarchitectes / Client: Rectorate of Mayotte

2022 Development of Professional Guidelines for CEB in Mayotte - Development of Professional Guidelines for CEB in Mayotte

2022 Assessment of technical requirements for the evaluation of CEB(S) masonry in the context of the French Overseas Departments (DROM) - Study commissioned by CSTB and carried out in partnership with CTMNC

Cinéma Guipry Messac - Lineaire A + OTE Ingénierie
Lycée Tani Malandi Chirongui - Mayotte - FBAA
Lycée des métiers du bâtiments de Longoni - Mayotte - EH
Réhabilitation du sanatorium à Dreux - VP & Green Engieering

2021 Standard XP P13-901, Member of the editorial committee - Project coordinator: CTMNC

2021 Emma Block – ZAC Flaubert, Grenoble - Client advisory support during the competition phase – Client: SEM Innovia

2018-2021 CYCLE TERRE, Sevran - Involvement in setting up processes and the production line, securing three ATEx A certifications, material testing, and training - A European project for the development of raw earth construction material supply chains using excavated soil from the Grand Paris project.13 partner organisations

2020 Le Foyer (Siorac de Ribérac) - Technical support for the raw earth work package - Design Team: Dauphins Architectes / MEP & Cost Consultancy: OVERDRIVE / Environmental Consultant: 180° / Structural Engineer: IBC / Landscape: Plain Air Client: Community Council (CC) + MFR du Pays Ribéracois

2020 University Institute of Technology (IUT) of Tarbes - Technical support for the raw earth work package - Design Team: Mil'Lieux Architectes + GP Architectes / Structural Engineer: TPFI / MEP: TPFI / Acoustics: TISSEYRE Client: Occitanie Region / Delegated Client: SPL Midi Pyrénées

SELECTED REFERENCES

2019 **Electrical Transformer Station, Lyon - Technical support for raw earth work -** Design Team: Tectoniques Architectes / Structural Engineer: Tectoniques / Client: Enedis

2019 **ATEx A CEB in French Guiana - Coordination and implementation -** Project lead and funding: DEAL Guyane

2018 **ATEx A CEB in Mayotte - Coordination and implementation -** Project lead: ART. Terre Mayotte / Funding: DEAL Mayotte

2018 **Electrical Substation, Tolbiac, Paris XII^{e} - Pre-feasibility study and client advisory (competition phase) -** Client: RTE (Réseau de Transport d'Électricité)

2016 **School Complex, Nanterre (ZAC des Provinces Françaises) - Support for contractor in drafting an ATEx B for rammed earth structures -** Client: City of Nanterre / Sustainable Construction Advisor: LesEnR / Design Team: TOA Architectes Associés, INCET, RFR Éléments, PEUTZ & Associés, DBG Paysagistes

2016 **LE CAP Business Incubator, Saint-Clair-de-la-Tour (Isère, France) - Client advisory for raw earth construction -** Design Team: P. Reach + Hors les Murs / MEP: AKOE / Quantity Surveyor: Biming / Structural Engineer: Vessière / Client: CC Les Vallons de la Tour

2015 **Ré-inventer Paris Gare Massena - Technical support for raw earth work -** Design Team: Joly Loiret / MEP: AI ENVIRONNEMENT / Quantity Surveyor: PASTIER / Structural Engineer: AR-C / Client: URBEM - *Project not selected*

2015 **Ré-inventer Paris TERRACARE (Paris) - Technical support for raw earth work -** Design Team: Katja Pargger & Catinca Popovici / Health Programming: IPSO Santé / Raw Earth Engineering: Vessière / Client: Kalelithos - *Project not selected*

2014 **Païamboué Middle School, Koné, New Caledonia - Technical support for raw earth construction -** Design Team: K'aDH + Berthier & Frassanito / Structural Engineers: BECIB – BEGN / Client: Province Nord / Delegated Client: SAEML VKP / Contractor (earth): Alternative Construction

2014 **Guest House, Hangzhou, China - Assistance Maitrise d'œuvre lot terre - Technical support for raw earth construction and setup of an on-site earth lab -** Design Team: Wang Shu, Amateur Studio / Client: Hangzhou University

2014 **Observation Tower, Dilsen-Stokkem - Technical assistance for raw earth construction -** Design Team: De Gouden Liniaal Architecten / Client: Province House Restructuring Committee – L'espace Directorate

Païamboué Middle School - K'aDH + Berthier & Frassanito
Le Foyer, Siorac de Ribérac - Dauphins architectes
CEES, Orléans - D&A+NAMA
Guest House Hangzhou - Wang Shu / amateur studio

2014 Bamyan Hospital, Bamyan, Afghanistan. Technical support for the raw earth work package - Design Team: ARCOP, Karachi / Client: Aga Khan Foundation

2012 European Soil Sample Conservatory (Orléans) - Technical support for the raw earth work package - Design Team: Design & Architecture + NAMA Architecture / Raw Earth Engineering: Vessière / Client: INRA Orléans / Raw Earth Contractors: Caracol + Héliopsis

A FEW NOTABLE EARLY PROJECTS :

1999 Architectural design support for the Société Immobilière de Mayotte (SIM) - Assistance with quality control and regulatory compliance

1986 Construction of two prototype housing units in CEB in Kourou, French Guiana - Client: SIMKO

1983 Le Domaine de la terre - 65 earth-built housing units, Villefontaine, Isère - Technical support for the raw earth work package - Client: OPAC 38

1982 Construction of low-cost housing, pilot operations in Passamainty, Mayotte - Support in setting up local brickyards, quarry identification, and construction of prototypes – Client: SIM

HABITAT UNIT

Ardakan Bazaar, Iran © Majid Hajmirbaba

THE HABITAT UNIT

The Habitat Unit of the CRAterre association focuses on the concept of housing in its broadest sense, i.e. as a human settlement. It takes a holistic and systemic approach to habitat, taking into account all its dimensions (social, environmental, economic, etc.). This approach considers not only how buildings are designed and constructed, but also how spaces are experienced and impact people's quality of life.

The aim of the Habitat unit is to produce practical, usable knowledge by developing concrete projects and conducting field experiments. These initiatives are carried out in partnership with local communities and stakeholders, thereby promoting co-construction and the involvement of everyone in the process. Through this approach, CRAterre seeks to respond to contemporary housing challenges while respecting the cultural and environmental specificities of the territories concerned.

The Habitat unit focuses its activities on three main areas.

FACILITIES AND COMMON GOODS

Contribute to the development of innovative approaches to the production/adaptation of human settlements in response to the challenges of sustainable development and climate change.

HABITAT UNIT

CRISIS PREPAREDNESS AND RESPONSE

Contribute to disaster risk reduction and improve the resilience of populations and human settlements by reverse-engineering local building cultures.

URBAN SLUMS / HABITAT FOR THE MOST DISADVANTAGED

Contribute to improving access to suitable and decent housing for as many people as possible by developing integrated methodological approaches and decision-making support.

SITUATED ARCHITECTURE

A contextual, holistic approach with a focus on localisation

Our approach to habitat design aims for site-specific architecture. It is based on an assessment of the area, including a study of local building cultures, their current dynamics and the future directions they appear to be taking. This assessment provides a basis for leveraging existing strengths, responding to current needs, anticipating future challenges and thus designing the most relevant project possible in a given context. The aim is to offer high-quality living environments that are accessible to all and adapted to diverse environments and lifestyles.

This approach is holistic: it takes into account environmental, social, economic, cultural and governance aspects and aims to have the best possible impact on these five pillars of sustainable development.

Co-design with local actors (residents, authorities, civil society organisations, etc.) is central to the approach, with a view to localisation. The Habitat unit provides support and capacity building with the aim of empowering local actors. The projects are designed to maximise benefits for the population, not only directly, but also indirectly with a view to achieving a higher level of resilience (accessibility of techniques, reproducibility with the resources available to the population, etc.).

Criteria for sustainable architecture © CRAterre
Production of adobe bricks, Burkina Faso © Olivier Moles

LOCAL BUILDING CULTURES

A Building Culture is the intangible dimension of a building or, more broadly, a human establishment built by people interacting with their environment in order to settle, work, move around, relax, etc. It includes elements related to the different phases of a building's life cycle, from design to use, including construction, maintenance, modification or replacement, which cover sociological, economic, environmental and, of course, cultural aspects. The environmental conditions and history of each place are decisive in its evolution and potential cohabitation, and explain the great diversity of Local Building Cultures around the world.

Local Building Cultures are particularly interesting in the context of (re)construction projects, as they are based on:

- existing knowledge and expertise mastered locally (local economy, reproducibility, maintenance),
- adapting housing to households' means, needs and lifestyles,
- rational use of locally available resources in response to environmental and climatic constraints.

FIELD PROJECTS

Field projects - research: an iterative approach

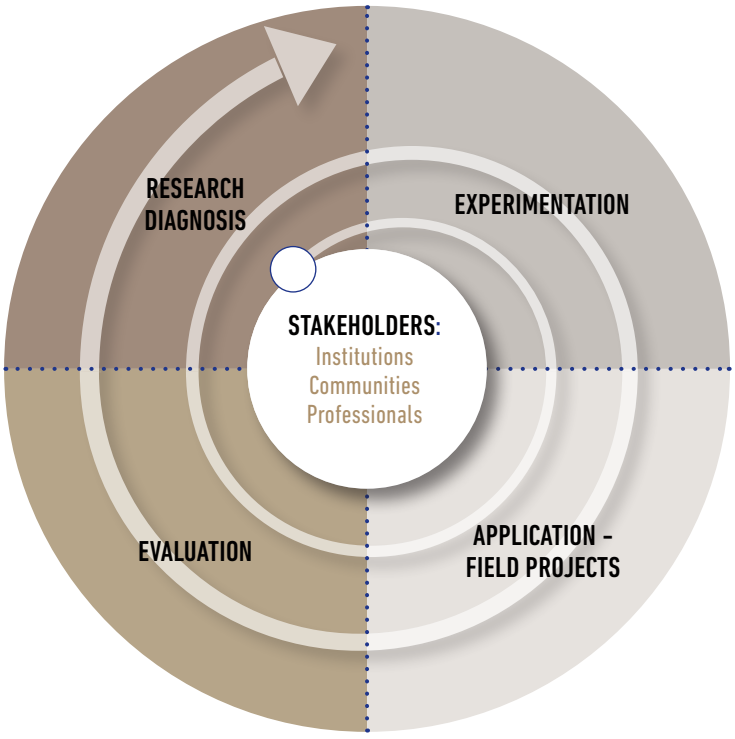
The Habitat unit of the CRAterre association works to improve habitat conditions by studying and rethinking local building cultures with stakeholders, through action research and capacity building. The approach adopted is iterative, linking the field, research and teaching: research and training are informed by operational experience, and operations are improved by research findings.

DIAGNOSIS

Field projects are systematically based on a territorial diagnosis that identifies the full potential of a territory for the social production of sustainable and eco-responsible housing, particularly local building cultures.

APPLICATION - FIELD PROJECTS

Co-designing projects with local actors ensures that they are tailored to local realities and that communities take ownership of the project. Construction sites are used as opportunities for training and mutual knowledge transfer, in order to strengthen skills, train and raise awareness among those involved in construction.



Post-typhoon assessment, Philippines © Elsa Cauderay
Participatory workshop, Romania © Olivier Moles
Seismic tests on the TCLA prototype © CRAterre
Dissemination meeting, Burkina Faso © Yaam Solidarité

EXPERIMENTATION

In certain projects, an experimentation phase allows constructive hypotheses to be validated. The link with the research team, ENSAG, Les Grands Ateliers and other university partners facilitates this process.

EVALUATION

Project evaluation allows us to take stock of lessons learnt, validate or invalidate initial assumptions, and improve the method for the next stage of the project or future projects.

DISSEMINATION - TRAINING

The experience and knowledge acquired are shared through publications, training courses, exhibitions, seminars, etc., in order to disseminate them widely. This knowledge is also reused for CRAterre's future projects.

RESEARCH

CRAterre professionals have the ability to take a step back and reflect on their practice. In this way, they contribute to research by drawing knowledge from their field experiences. These research activities are facilitated by the strong relationship with the CRAterre research team.

FIELDS OF ACTION

ASSISTANCE WITH THE IMPLEMENTATION OF PROJECTS USING LOCAL MATERIALS

The Habitat unit works to develop reasoned, contextualised architecture based on the best use of existing local resources, whether human (knowledge and expertise) or material (organic and geo-sourced materials), while respecting local cultures. We have developed skills that enable us to support our partners (United Nations and international organisations, states, NGOs, entrepreneurs, civil society organisations, populations) at all stages of the project process, from understanding the request to its implementation and evaluation.

SKILLS BUILDING

The Habitat unit promotes community empowerment in improving their living environment. It therefore supports local stakeholders in structuring themselves, organising themselves into networks and training in organisational and technical aspects.

DISSEMINATION OF KNOWLEDGE, AWARENESS RAISING

The Habitat unit aims to widely disseminate knowledge about local materials and construction techniques and to raise awareness among decision-makers about the ecological and societal issues related to the use of local materials. It therefore publishes a variety of communication materials aimed at different audiences and organises and participates in various events (seminars, symposiums, conferences, etc.).

Andkhoï School, Afghanistan @ Olivier Moles
Training in earth construction © CRAterre
Territorial diagnosis, Burkina Faso © Enrique Sevillano Gutiérrez
Support to IOM Somalia © Enrique Sevillano Gutiérrez

SKILLS AND SERVICES

The Habitat unit offers its expertise for the following services:

SUPPORT FOR TERRITORY ASSESSMENT

- Conduct a holistic and participatory assessment of the territory (environmental, economic, social, cultural, governance and regulatory aspects)
- Identify building cultures and local material and human resources relevant to the project
- Identify local best practices and their potential for improvement
- Analyse the potential of locally available bio-based and geo-sourced materials that can be used in construction
- Propose earth construction techniques that are suited to the specific characteristics of local resources (human and material)
- Understand the regulatory, academic and vocational training environment and its impact on the development potential of the construction sector
- Map out the key players

SUPPORT FOR PROJECT DESIGN

- Understand the project (challenges, objectives, desired outcomes, strategies to be implemented)
- Co-design the project with stakeholders
- Analyse feasibility (concept, economics, planning, obstacles and levers, etc.)
- Implement tools and methods that enable project agility and flexibility

FIELD SUPPORT

- Train sector stakeholders in building design, construction and the production of necessary materials
- Implement information, awareness-raising and training strategies aimed at the various target audiences (residents, artisans, designers, politicians, academics, financiers, etc.)

STRENGTHENING THE SKILLS OF LOCAL RELAYS

- Strengthen the organisational skills of local partners
- Strengthen training skills (trainer training, implementation of training courses)
- Create teaching materials for different training levels (craftspeople, site managers, architects, engineers)
- Produce communication, advocacy and awareness-raising materials
- Support necessary regulatory changes
- Support the structuring of networks

SELECTED REFERENCES

URBAN SLUMS / HOUSING FOR THE MOST DISADVANTAGED

ONGOING Framework contract with Emmaus International - Technical support for housing projects in communities in Europe, Asia, America and Africa - Funding: FLD

ONGOING Framework contract with the Fondation pour le logement des défavorisé·e·s - Support for FLD partners - international (Senegal, Mauritania, Kenya, Nepal, etc.) - Funding: FLD

ONGOING Promoting healthy and safe housing from a gender perspective in Mesoamerica - Funding: AFD, FLD

ONGOING Improvement of rural housing and construction of health centres in the Democratic Republic of Congo - Funding: Misereor, Caritas Lubumbashi

ONGOING Improving living conditions in informal settlements ! Phase 2 - Support to Yaam Solidarité for social housing production in Burkina Faso - Funding: AFD, FLD

ONGOING Action for Habitat in El Salvador and Haiti (phase 3) - Improving habitat and living conditions for families in precarious situations in rural areas - Funding: AFD, FLD

ONGOING Decent housing for all ! Phase 2, Madagascar - Support to ENDA-OI for the improvement of housing conditions and social mobilisation of residents in the slums of Antananarivo - Funding: AFD, FLD

ONGOING - Post-disaster response to flooding in Kaédi, Mauritania - Support for GRDR - Funding: FLD

2022-2023 Framework contract with the Abbé Pierre Fondation, Gender & Housing - Collection of experiences from gender-sensitive housing projects carried out by FAP partners (housing cooperatives and social housing production in El Salvador, Cuna de la Paz / Cité FSH project in Senegal) https://craterre.hypotheses.org/5584

2021-2023 Action for Habitat in El Salvador and Haiti (phase 2) - Improving housing and living conditions for vulnerable families in rural areas - Funding: AFD, FAP

2021-2023 Improving living conditions in informal settlements ! - Support to Yaam Solidarité for social housing production, multi-country project in Burkina Faso, Senegal, Guinea-Bissau - Funding: AFD, FAP https://craterre.hypotheses.org/5420

2020-2021 Framework contract with the Abbé Pierre Fondation, Urban Sahel - Study to characterise urbanisation processes and their impact on housing conditions in six countries: Senegal, Mauritania, Mali, Burkina Faso, Niger and Chad

2010-2011 Workshop on earthen architecture in Colombia - Increasing the safety and resilience of homes, community work and knowledge transfer

Temporary shelter, Somalia © Héctor Esteban
Earth construction training, Mexico © Cuauhtli Tlatoani
Training site, Burkina Faso © Yaam Solidarité
Renovated wattle and daub house, El Salvador © Elsa Cauderay

CRISIS PREPAREDNESS AND RESPONSE

ONGOING Decision support for Shelter Clusters and the Global Shelter Cluster (GSC) - Support activities for Shelter Clusters in Burkina Faso, Yemen, Venezuela, Somalia, north-western Syria, Nepal and north-eastern Nigeria: production of shelter response profiles and various related activities - Funding: ECHO, BHA-USAID, Partnership Agreements with UNHCR, IOM https://craterre.hypotheses.org/tag/fiche-reponse-abris

ONGOING Support to IOM Somalia for the implementation of transitional shelter solutions - Upgrading emergency and transitional shelters to more comfortable and durable shelters using local materials - Funding: IOM Somalia

2022-2023 Programme on endangered wooden architecture - Documentation of wooden architecture in the Himalayas along the Tamang Heritage Trail (Nepal) - Funding: Oxford Brookes University, Labex, CRAterre-AE&CC-ENSAG-UGA

2020 Self-recovery Project Malawi - Action research project focusing on better consideration of local practices and knowledge in the field of disaster response

2020 Remote support to Caritas Bangladesh on the community-based approach, post-disaster response based on the strengths of Local Building cultures - Application to two projects in the Chittagong area - Funding: Caritas Bangladesh, BUET, CRS

SELECTED REFERENCES

2019-2024 **TCLA+ Consolidating the Improved Local Construction Techniques construction sector in Haiti -** Financement : Union Européenne, Misereor https://www.rezo-tcla-haiti.com/

2019-2020 **Soil analysis in Rohingya camps and host communities in Cox's Bazar District, Bangladesh -** Funding: CRS, Caritas Germany, Caritas Bangladesh

2019 **Re-engineering Local Building Cultures as part of a post-earthquake reconstruction and local capacity building programme, Nepal -** Funding: ASF Nepal, Caritas Luxembourg

2019 **Support for households affected by the earthquake to build community resilience, Sindhupalchowk, Nepal -** Support for TGH and ARSOW - Funding: AFD, Fondation de France

2019 "**Build Back Safer" training for local craftsmen following Cyclone Idai, Beira, Mozambique -** Funding: IFRC

2019 **Technical support mission in the shelter/human settlements sector, Timor-Leste** - Funding: IOM

2015-2018 **Support for post-disaster reconstruction in Nepal -** Funding: Swiss Red Cross, Caritas Luxembourg, Fondation de France

2014-2016 **Improving living conditions for populations affected by Typhoon Haiyan in Aklan, Philippines -** Funding: Local populations, Secours Catholique / Caritas France and Caritas Belgium https://craterre.hypotheses.org/2336

FACILITIES AND COMMON GOODS

ONGOING **2 demonstration buildings for INES University and Technical College in Ruhengeri, Rwanda -** Funding: Misereor

ONGOING **Two adobe health centres to combat the medical desert in Chad -** Funding: Caritas Sarh / Misereor

ONGOING **R+3 office in Bamako -** Funding: National Caritas / Misereor

ONGOING **Hospital in Koudougou and four health centres in Fada Gourma, Dédougou, Yalgo and Koudougou, Burkina Faso -** Funding: Misereor, diocesan Caritas organisations and religious congregations

ONGOING **Justice and Peace Commission of Bamenda and Kumbo, Cameroon -** Funding: Misereor, Caritas Buea

ONGOING **Promotion of eco-construction through the 10 national offices of Inades Formation in Africa -** Funding: Misereor, RCI: Inades Formation International

2023 **Support for GRET in the eco-design of contextualised sanitation infrastructure -** pilot models of sanitary blocks made from local materials in Senegal - Funding: GRET

2022 **Practical workshop on teaching by doing at Kongo University, Democratic Republic of Congo**

2021-2023 **Project to promote sustainable housing in the Cacheu and Boké regions (Guinea-Bissau) -** Support for Grdr in conducting a territorial assessment, providing training and setting up a training centre, and developing a simplified IMPEEC tool - Funding: FAP

Training site on finishing work, Haiti © Christian Belinga Nko'o
Consultation on the LBC concept, Bangladesh © Olivier Moles
Training of trainers, DRC © Alexandre Douline
Grand Boulage School, Haiti © Christian Belinga Nko'o

2019 Construction of school infrastructures using local materials, Democratic Republic of Congo - Funding: Kindermissionswerk, Caritas Kisangani

2019 Potential of local know-how to meet housing demand in the Democratic Republic of Congo - Funding: UNHCR

2019 Climate change and urban construction - Demonstration buildings in Cameroon (Buea), Burkina Faso (Ouagadougou), Mali (Sikasso) and Ivory Coast (Abidjan)

2019-2020 Design, training, construction and analysis of improved onion storage granary models in the Matam region, Senegal - Funding: Entrepreneurs du Monde

2015-2020 Support to the AFD Education Division for the identification and implementation of school construction programmes - Feasibility studies, diagnosis, planning, evaluation and implementation of educational infrastructure in several countries in Africa, Asia and Latin America - Funding: AFD

2014-2016 Typha in Senegal - Developing building materials using earth and a plant fibre from the Typha australis plant

HERITAGE UNIT

Merv, Turkmenistan © David Gandreau

THE HERITAGE UNIT

Earthen architectural heritage reflects the ability of people to adapt to the diverse natural, social, cultural, and economic contexts of our planet. Highlighting the creativity of these architectures and the cultural landscapes they have shaped allows us to draw inspiration from the past in order to better plan for the future.

The heritage unit of CRAterre association is dedicated to studying these architectures in both their tangible and intangible dimensions, with the aim of preserving resources and improving the well-being of all.

LOCAL RESOURCES AT THE HEART OF ACTIONS

A participatory approach is a constant concern in field projects. Strengthening capacities by relying on local human and material resources fosters autonomy in management as well as sustainable local conservation of sites.
Involving communities in the diagnosis and conservation of heritage enhances their sense of belonging and pride, and encourages them to envisage bright perspectives in which heritage plays a central role.

HERITAGE AT THE CENTRE OF LOCAL DEVELOPMENT

Although architecture is at the heart of our activities, we aim to go beyond simply preserving built heritage. By placing culture at the centre of our development initiatives, we ensure that local communities and stakeholders are the primary beneficiaries of the actions taken to protect their heritage. This helps to promote local identities and strengthen cultural diversity, which is essential to the fulfilment of our society.

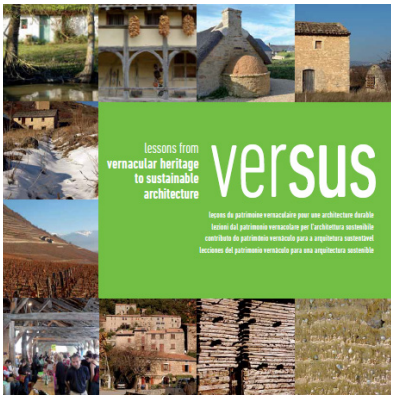
VERNACULAR HERITAGE AS A SOURCE OF INSPIRATION

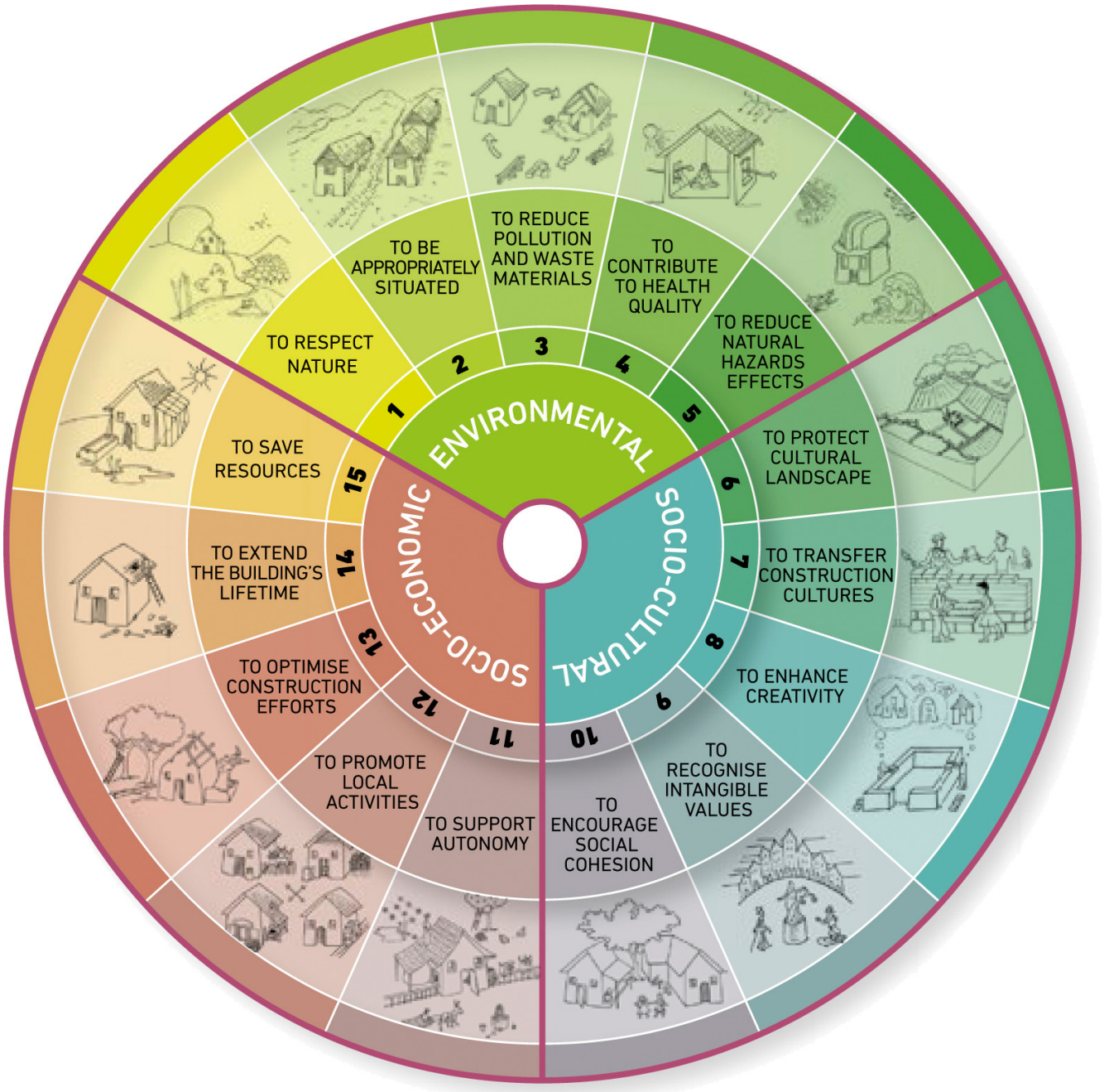
In a globalised context with easy access to industrial materials, urban and architectural projects that lack coherence with their territory have become the norm. Vernacular architecture constitutes a genuine source of inspiration for contemporary eco-responsible architecture, combining cultural expressiveness with harmony within the natural environment.
We strive to promote the environmental, cultural, and socio-economic coherence that these architectures maintain with their territories and pay tribute to them in our contemporary designs.

THE HERITAGE UNIT

CRAterre is actively engaged in the development of educational and methodological tools aimed at raising awareness and mobilising different audiences around the understanding and enhancement of their territories. These tools address territorial issues through the prism of architecture, traditional know-how, and local materials. By focusing on these dimensions, CRAterre seeks to shed light on highly complex issues while encouraging a holistic approach linking history, culture, and contemporary environmental issues.

The VerSus tool, for instance, developed in collaboration with four other European universities, highlights the valuable lessons we can learn from vernacular constructions to inspire the design of contemporary sustainable architecture that respects natural resources and local know-how. The VerSus tool allows us to explore how traditional skills, materials, and architectural forms can be reinterpreted to address current challenges, such as climate change, the need to reduce our ecological footprint, and the necessity of building resilient communities. Drawing inspiration from the past particularly stimulates the creativity of younger generations of students wishing to meet the demands of sustainable development.





Principles of environmental, socio-cultural, and socio-economic sustainability © VerSus Project / CRAterre

FIELDS OF ACTION

DIAGNOSIS

- Diagnosis of sites and buildings (from all periods and contexts), including archaeological sites;
- Participatory diagnosis of territories;
- Analysis of deterioration processes;
- Evaluation and management of natural and human-induced risks to heritage.

MANAGEMENT

- Preparation of participatory management plans;
- Development of projects that highlight the benefits of heritage for local populations;
- Development of international programmes on heritage conservation;
- Support to local authorities in inventorying, conserving, and enhancing heritage;
- Development of participatory projects involving local human resources in heritage conservation.

CONSERVATION

- Design of conservation projects in accordance with ethical and legal standards;
- Implementation/supervision of conservation, restoration, and rehabilitation works for any type of site;
- Conservation of archaeological sites during and after excavations;
- Drafting of conservation plans and architectural and landscape charters;
- First aid for material heritage in crisis situations.

MATERIAL EXPERTISE

- Soil analysis;
- Support in setting up analysis laboratories;
- Identification of quarries and sourcing;
- Testing material production;
- Establishing production lines for conservation materials.

ENHANCEMENT & DISSEMINATION

- Promoting sites through publications ranging from leaflets to scientific works;
- Designing exhibitions of various sizes and formats;
- Creating and running awareness workshops for the public on vernacular architecture conservation.

TEACHING & RESEARCH

- Training for all categories of audiences;
- Organisation and supervision of local or regional training workshops;
- Development of research programmes;
- Organisation of international scientific meetings;
- Participation in international scientific and technical committees;
- Participation in university teaching;
- Production of state-of-the-art studies and analytical bibliographies;
- Supervision of PhD theses and student works.

SKILLS AND SERVICES

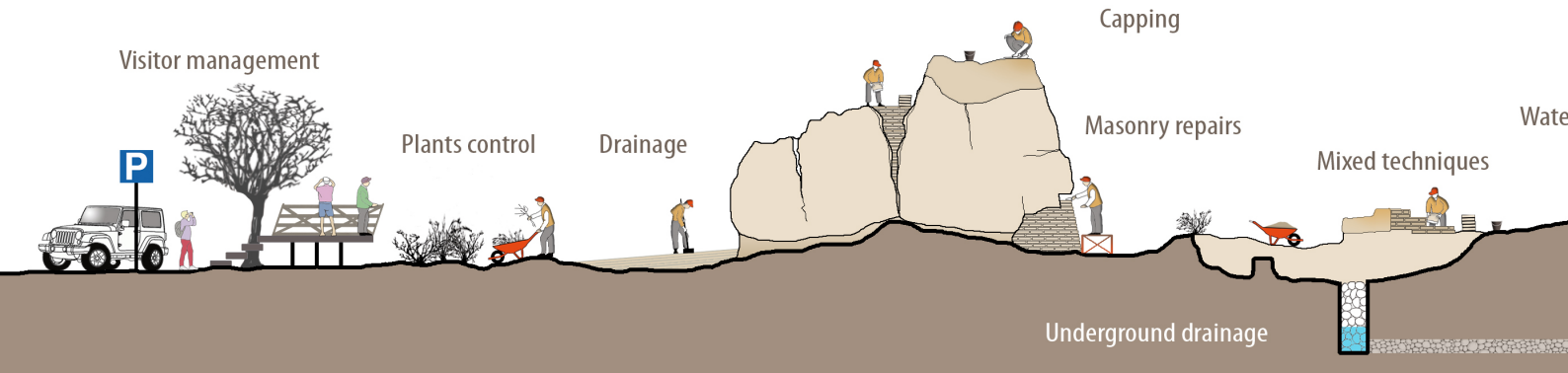
The heritage unit offers its expertise in the following areas:

SUPPORT, ADVICE TO LOCAL AUTHORITIES IN THE MANAGEMENT OF THEIR HERITAGE

- Support in identifying heritage potential (values and potential for tourism development);
- Support and advice for the effectiveness of legal tools (development of regulations, dissemination of legal texts, definition of good practices, etc.);
- Support for the development of tools to assist citizens in conserving their living environment;
- Support in defining strategies for site enhancement;
- Development of training programmes for local and central authorities.

SUPPORT, ADVICE FOR THE MANAGEMENT, CONSERVATION AND ENHANCEMENT OF ARCHAEOLOGICAL SITES

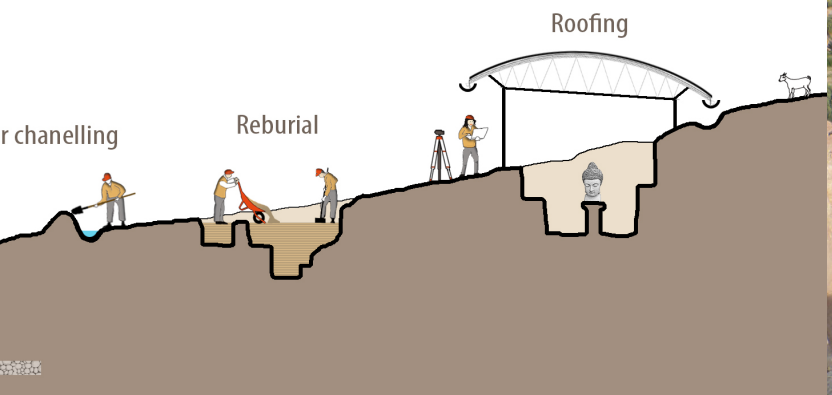
- Development of management plans;
- Development of protection plans for excavated remains to minimise risk;
- Architectural and archaeological study of elevations;
- Training in technical and heritage diagnosis;
- Assistance in defining relevant conservation choices;
- Implementation of preventive conservation works and on-site training of teams;
- Advice and support in site enhancement;
- Definition of training programmes, development of didactic and educational tools.



Rammed earth building in Lieudieu, France © Sébastien Moriset
Chogha Zanbil, Iran © Sébastien Moriset
Saï, Sudan © Sébastien Moriset
Aït Ben Haddou, Morocco © Sébastien Moriset

SUPPORT AND ADVICE FOR THE MANAGEMENT, CONSERVATION AND PROMOTION OF WORLD HERITAGE SITES

- Assistance in preparing nomination files for inscription on the World Heritage List;
- Advice and support in developing management plans using a participatory approach;
- Advice, technical support and/or training for the conservation (preventive measures, restoration, etc.) and promotion of World Heritage sites with a view to sustainable local development.



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WORLD HERITAGE

2020-2023 Benin, Proposal for the extension of the Koutammakou landscape, land of the Batammariba - Funding: UNESCO.

2018 Burkina Faso, Nomination file preparation for the Ancient Iron Metallurgy Sites - Support to the Heritage Directorate in drafting the inscription proposal for five sites - Funding: UNESCO.

2015-2016 Iran, Assistance for the World Heritage nomination of Yazd historic city - Innovative management actions including participatory identification of needs and implementation of preventive projects with residents - Funding: ICHHTO.

2009-2011 Senegal, Nomination file preparation for the Bassari land - Support to Senegalese authorities in drafting the inscription proposal and development of a management plan - Funding: UNESCO.

2008-2015 Burkina Faso, Archaeological site of Loropéni - Support for the site's inscription on the World Heritage List. Experimentation, conservation, training, dissemination. Support in designing the reception and research centre - Funding: World Monument Fund, UNESCO, DGPC.

CRAterre has worked on 56 World Heritage Sites and 19 nomination files prepared by the team have led to the inscription of properties on the UNESCO World Heritage List.

CONSERVATION & REHABILITATION

2022-2024 Niger, Rehabilitation of Agadez historic centre - Support for rehabilitation actions, documentation and capitalisation of actions carried out - Funding: ALIPH.

2018-2019 Algeria, Rehabilitation of Timimoun earthen architectural heritage - Rehabilitation of an adobe house, documentation of good conservation practices, creation of a rehabilitation manual - Funding: UNESCO, European Union, Swiss Cooperation.

2013-2015 Mali, Methodological and technical assistance for the reconstruction programme on northern Mali built heritage - Financement : UNESCO, Union européenne, Coopération Suisse.

2010-2012 Ecuador, Historic city of Cuenca - Demonstrative preventive conservation project for the benefit of local authorities and citizens of the historic city - Funding: UNESCO, Panasonic.

2004-2008 Morocco, Conservation of the Ksar of Aït-Ben-Haddou - Documentation of good conservation practices, drafting of a management plan, conservation and restoration works - Funding: UNESCO.

Kerma-Doukki Gel site, Sudan © Chamsia Sadozaï
Restoration of the Askia Tomb, Mali © Abdoulaye Cissé
Conservation of the Fayaz Tepa site, Uzbekistan © CRAterre
Training on conservation, Merv, Turkmenistan © Sébastien Moriset

URBAN AND LANDSCAPE CHARTERS

2019-2022 Iran, Protection of adobe architecture in the old city of Yazd - Support for the development of an illustrated manual of urban and architectural prescriptions applied to the historic core of Yazd, inscribed on the World Heritage List - Funding: European Union.
https://craterre.hypotheses.org/5255

2018 Cape Verde, Protection of Cidade Velha historic centre - Drafting of an illustrated manual of urban and architectural prescriptions applied to the World Heritage site - Funding: UNESCO.
https://craterre.hypotheses.org/2151

2014-2015 Côte d'Ivoire, Historic town of Grand-Bassam - Development of didactic tools clarifying regulations and good practices for construction and rehabilitation in a World Heritage town, intended for institutions, professionals and the general public - Funding: European Union.
https://craterre.hypotheses.org/3582

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CONSERVATION OF ARCHAEOLOGICAL SITES

2021-2024 **Egypt and Sudan, Study and conservation of earthen architecture in the ancient Nile Valley -** Diagnosis of degradation processes, conservation works, experimental archaeology - Funding: ANR.

2018-2022 **Armenia, Conservation and enhancement of Erebuni and Karmir Blour archaeological sites -** Capacity building, launch of an adobe production line, strengthening collaborations - Funding: AIMF, French Ministry of Culture.

2017-2022 **United Arab Emirates, Conservation and enhancement project for the archaeological site of Hili 2 -** Diagnosis, research on conservation techniques, conservation of remains, and design of signage - Funding: Department of Culture and Tourism, Emirate of Abu Dhabi.

2007-2015 **Tajikistan, Conservation and enhancement Sarazm site -** Experimentation and development of appropriate conservation techniques. Training and dissemination - Funding: French Ministry of Culture

2007-2015 **Turkmenistan, Conservation of Ancient Nisa Parthian fortresses -** Strengthening and improvement of conservation activities on the site, installation of a soil analysis laboratory and identification of earth quarries suitable for conservation works - Funding: UNESCO.

HERITAGE & DEVELOPMENT

2016 **France, Enhancement of regional rammed earth heritage in the Auvergne-Rhône-Alpes region -** Inventory of remarkable rammed earth sites and ensembles, mapping of local initiatives and actors, development of tools and mechanisms for the enhancement of this heritage - Funding: Auvergne Rhône-Alpes Region.
https://terrespise.hypotheses.org/

2015 **Gambia, Tourism development of Albreda-Juffureh village -** Participation in the Action Plan to revitalise tourism in the village, design of information panels with the help of local guides and artisans - Construction of the tourist information centre - Funding: Gambia Tourism Board, National Council for Arts and Culture.

2013-2016 **Tanzania, Enhancement of Kilwa heritage resources to support social and economic development -** Inventory of natural and cultural resources, implementation of a management system and strengthening of the legislative framework, creation of guesthouses and an information centre, training of guides - Funding: European
https://craterre.hypotheses.org/?s=kilwa

2010-2012 **West Africa, Cultural heritage and local development -** - Capacity building and legitimacy reinforcement programme for African local authorities for the creation of local development projects linked to the heritage qualities of their territories - Funding: European Union.

Vernacular architecture in Kilwa, Tanzania © Sébastien Moriset
Heritage tour in northern Spain © Lydie Didier
Albreda-Juffureh Information Centre, Gambia © Nuria Sanchez Munoz
Training module in Saudi Arabia © Sébastien Moriset

KNOWLEDGE TRANSFER

2023 Palestine, Training programme on earthen architecture conservation - Organisation of a symposium and theoretical and practical training on the conservation of Tell es-Sultan site - Funding: UNESCO, MoTA, Sapienza University of Rome, AICS Jerusalem Office.

2022-2024 Saudi Arabia, Implementation of a teaching module on heritage conservation - Theoretical and practical training - Funding: TRITA.

2021 France, Training on rammed earth heritage for local authority staff - Values and challenges linked to rammed earth buildings, key technical aspects to consider during interventions - Funding: CAPI, VDD, CNFTP.

2021 Saudi Arabia, Awareness workshops on earthen architecture in the old city of AlUla - Raising local awareness about the earthen heritage of the region and the potential of local materials for contemporary construction - Funding: Afalula.

2020-2022 Uzbekistan, Training on the conservation of earthen architecture - Theoretical and practical training for heritage conservation professionals - Funding: EBRD.

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